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SP 11 (1973): Recommended SI Units for Textiles [TXD 1: Physical Methods of Tests]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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**RECOMMENDED SI UNITS
FOR TEXTILES**



INDIAN STANDARDS INSTITUTION

SP : 11 - 1973

**RECOMMENDED SI UNITS
FOR TEXTILES**



**INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

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RECOMMENDED SI UNITS FOR TEXTILES

FOREWORD

This publication which has been processed by the Physical Methods of Test Sectional Committee, TDC 1, the composition of which has been given in Appendix A, had been approved for publication by the Textile Division Council of ISI.

In textile trade and industry the measurement of various characteristics plays an important role in the analysis, quality control, sale-purchase and checking up for compliance to the standard. For easy understanding and interpretation of figures by different interests, it becomes essential to changeover to a unified set of units which have been accepted at national as well as international level. This publication has, therefore, been issued for the guidance of users for changing over to SI system, with a view to unifying the set-up of units in various facets of textile trade and industry. Wherever the SI units differ from metric units, the metric units with which the industry is familiar have also been given.

1. SCOPE

1.1 This publication contains a list of SI units recommended for use in the textile industry and trade.

2. TERMINOLOGY

2.1 Newton (N) — Force which, when applied to a body having a mass of one kilogram, gives it an acceleration of one metre per second per second.

$$1 \text{ millinewton (mN)} = 10^{-3} \text{ N (Newton)}$$

$$1 \text{ kilogram force (kgf)} = 9.80665 \text{ N (Newton)}$$

$$1 \text{ gramforce (gf)} = 9.80665 \text{ mN (millinewton)}$$

3. LIST OF UNITS

3.1 Table 1 lists the characteristics, SI units (their metric equivalents, wherever necessary), abbreviations and their fields of application.

TABLE 1 RECOMMENDED SI UNITS FOR TEXTILES
(Clause 3.1)

Sl. No.	PROPERTY	SI UNITS		METRIC UNITS		APPLICATION
		Unit	Abbreviation	Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Length	Millimetre	mm	—	—	Fibres
		Millimetre, centimetre	mm, cm	—	—	Samples and test specimens (as appropriate)
		Metre	m	—	—	Yarns, ropes and cordages, fabrics
2.	Width	Millimetre	mm	—	—	Narrow fabrics
		Centimetre	cm	—	—	Other fabrics
		Millimetre, centimetre	mm, cm	—	—	Samples and test specimens (as appropriate)
		Centimetre*, metre	cm, m	—	—	Carpets, druggets, durries (as appropriate)
3.	Thickness	Micrometre (micron)	μ m	—	—	Delicate fabrics
		Millimetre	mm	—	—	Other fabrics, carpets, felts
4.	* Linear density	Tex	tex	—	—	Yarns
		Millitex	mtex	—	—	Fibres
		Decitex	dtex	—	—	Filament and filament yarns
		Kilotex	ktex	—	—	Slivers, ropes and cordages
5.	Diameter	Micrometre (micron)	μ m	—	—	Fibres
		Millimetre	mm	—	—	Yarns, ropes, cordages
6.	Circumference	Millimetre	mm	—	—	Ropes, cordages

7. Threads in cloth:							
Length	{ Number per centimetre Number per decimetre	ends/cm ends/dm	—	—	{ Woven fabrics (as appropriate)		
Width	{ Number per centimetre Number per decimetre	picks/cm picks/dm	—	—			
8. Warp threads in loom	Number per centimetre	ends/cm	—	—	Reeds		
9. Stitches in cloth:							
Length	{ Number per centimetre Number per decimetre	courses/cm courses/dm	—	—	{ Knitted fabrics (as appropriate)		
Width	{ Number per centimetre Number per decimetre	wales/cm wales/dm	—	—	{ Knitted fabrics Made-up fabrics		
10. Stitch length	Millimetre	mm	—	—	Fabrics		
11. Mass per unit area	Grams per square metre	g/m ²	—	—	Fabrics		
12. Mass per unit length	Grams per metre	g/m	—	—	Yarns, ropes (as appropriate)		
13. Twist	{ Turns per centimetre Turns per metre	turns/cm turns/m	—	—	Fibres, yarns and fabric specimens (as appropriate)		
14. Test or gauge length	Millimetre, centimetre	mm, cm	—	—	Fibres, delicate yarns (skeins or individual)		
15. Breaking load	Millinewton	mN	grams force	gf	Strong yarns (individual or skeins), ropes and cordages, fabrics		
	Newton	N	kilogram force	kgf			

*For conversion of values in traditional counts to the tex and *vice versa*, reference to IS : 3689-1966 'Conversion factors and conversion tables for yarn counts' shall be made.

(Continued)

*For conversion of values in traditional counts to the tex and *vice versa*, reference to IS : 3689-1966 'Conversion factors and conversion tables for yarn counts' shall be made.

TABLE 1 RECOMMENDED SI UNITS FOR TEXTILES — *Contd*

SL No.	PROPERTY	SI UNITS		METRIC UNITS		APPLICATION
		Unit	Abbreviation	Unit	Abbreviation	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
16.	Breaking length	Kilometre	km	—	—	Yarns
17.	Tenacity	Millinewton per tex	mN/tex	grams force per tex	gf/tex	Fibres, yarns (individual or skeins)
18.	Twist factor or twist multiplier	Turns per centimetre $\times$ square root of tex Turns per metre $\times$ square root of tex	turns/cm $\times \sqrt{\text{tex}}$ turns/m $\times \sqrt{\text{tex}}$	—	—	Yarns (as appropriate)
19.	Bursting strength	Newton per square centimetre	N/cm ²	kilogram force per square centimetre	kgf/cm ²	Fabrics
20.	Tear strength	Millinewton	mN	grams force, kilogram force	gf, kgf	Fabrics (as appropriate)
21.	Pile height	Newton	N	—	—	Carpets
22.	Pile density	Millimetre Mass of pile yarn in grams per square metre per millimetre pile height	mm g/m ² /mm pile height	—	—	Pile carpet
23.	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/unit deformation	grams force per tex per unit deformation	gf/tex/unit deformation	Fibres, yarns, strands

NOTE — Where more than one unit have been given for one characteristic, any of the units may be used appropriate.

APPENDIX A

(see Foreword)

COMPOSITION OF PHYSICAL METHODS OF TEST SECTIONAL COMMITTEE, TDC 1

The Physical Methods of Test Sectional Committee, TDC 1, which is responsible for processing this publication, consists of the following:

<i>Chairman</i>	<i>Representing</i>
DR T. RADHAKRISHNAN	Indian Jute Industries' Research Association, Calcutta
<i>Vice-chairman</i>	
DR V. SUNDARAM	Cotton Technological Research Laboratory (ICAR), Bombay
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AGRICULTURAL MARKETING ADVISER TO THE GOVERNMENT OF INDIA	Directorate of Marketing & Inspection (Ministry of Agriculture), Faridabad
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SHRI T. V. ANANTHAN	The Bombay Textile Research Association, Bombay
SHRI T. S. CHANDRASEKHARIAH	Government of Mysore
SHRI K. K. CHATTERJEE	Office of the Jute Commissioner, Calcutta
SHRI G. N. CHATTERJI	Ministry of Defence (R & D)
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SHRI A. R. S. GOPALACHAR	Central Silk Board, Bombay
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SHRI S. P. MULLICK	National Test House, Calcutta
SHRI I. L. PATEL	Directorate General of Supplies & Disposals (Inspec- tion Wing), New Delhi
SHRI A. K. PRAMANICK (<i>Alternate</i>)	

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<i>Members</i>	<i>Representing</i>
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SHRI S. M. CHAKRABORTY, Director (Tex)	Director General, ISI (<i>Ex-officio Member</i>)
	<i>Secretary</i>
	SHRI D. R. KOHLI
	Deputy Director (Tex), ISI

APPENDIX B

(See Foreword)

INDIAN STANDARDS

ON

PHYSICAL METHODS OF TEST FOR TEXTILES

ISI has so far issued the following Indian Standards in this field:

Is.

- 233-1954 Methods for determination of mean fibre-length of cotton and the proportion by weight of fibres of different length-grades in cotton
- 234-1973 Method for determination of linear density of textile fibres (gravimetric method) (*first revision*)
- 235-1954 Methods for determination of mean single fibre-strength and intrinsic strength (cotton)
- 236-1968 Methods for determination of cotton fibre maturity (by sodium hydroxide swelling method) (*first revision*)
- 237-1951 Method for determination of cotton yarn count (or yarn melidity in tex)
- 239-1951 Method for determination of lea breaking load (strength) of cotton yarn and its count-lea-strength product
- 832-1964 Method for determination of twist in yarn
- 1315-1959 Method for determination of universal count of cotton yarn
- 1670-1970 Method for determination of breaking load, elongation at break and tenacity of yarns (*first revision*)

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- 1671-1960 Method for determination of skein breaking load (strength), tenacity and yarn strength index of cotton yarn (by constant-rate-of-traverse machine, (metric system)
- 1954-1969 Methods for determination of length and width of fabrics (*first revision*)
- 1963-1969 Methods for determination of threads per decimetre in woven fabrics (*first revision*)
- 1964-1970 Methods for determination of weight per square metre and weight per linear metre of fabrics (*first revision*)
- 1966-1961 Methods for determination of bursting strength of woven and knitted fabrics
- 1969-1968 Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*)
- 2387-1969 Methods for determination of weight of jute fabrics (*first revision*)
- 2702-1965 Method for determination of thermal resistance of textile fabrics, guarded hot-plate method
- 2899-1965 Method for determination of percentage of medullated fibres in wool
- 3112-1966 Method for determination of comp and count of yarn removed from fabrics
- 3674-1966 Method for determination of micronaire value of cotton fibres
- 3675-1966 Method for determination of bundle strength (tenacity) of cotton fibres
- 4681-1968 Method for determination of wrinkle recovery of fabrics (by measuring crease recovery angle)
- 4871-1968 Method for determination of lint and trash content of cotton by means of mechanical pneumatic machines
- 4902-1968 Method for determination of correct invoice weight and moisture content of woollen and worsted yarns
- 6359-1971 Method for conditioning of textiles
- 6490-1971 Method for determination of stiffness of fabrics — cantilever test

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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